```
*****************************************************************
*                                                               *
* CP/M vers 2.2 Cold Start Loader.                              *
*                                                               *
* The following routines will boot CP/M from the Disk           *
* Jockey 2D Rev. B, or from the Disk Jockey Hard disk           *
* controller.                                                   *
*                                                               *
* Floppy boot:                                                  *
* The cold boot loader (track Ø, sector 1) is loaded into       *
* RAM on the controller by the cold boot routine in the         *
* firmware.  This cold boot loader will start loading the       *
* CCP from track Ø, sector 5 and will finish up with the        *
* last part of the CBIOS on track 1 sector 7.                   *
*                                                               *
* During a warm boot sectors 1, 2, and part of 3 will be        *
* loaded from track 1.  Track Ø loading is unaffected.          *
*                                                               *
*    track    sector    sysgen    load order       Name         *
*                                                               *
*       Ø         1        9ØØ    ffØØ      1      Boot loader  *
*       Ø         2        98Ø                     Unused       *
*       Ø         3        aØØ                                  *
*       Ø         4        a8Ø                                  *
*       Ø         5        bØØ    95ØØ      2      CCP          *
*       Ø         6        b8Ø    958Ø     13                   *
*       Ø         7        cØØ    96ØØ      3                   *
*       Ø         8        c8Ø    968Ø     14                   *
*       Ø         9        dØØ    97ØØ      4                   *
*       Ø        1Ø        d8Ø    978Ø     15                   *
*       Ø        11        eØØ    98ØØ      5                   *
*       Ø        12        e8Ø    988Ø     16                   *
*       Ø        13        fØØ    99ØØ      6                   *
*       Ø        14        f8Ø    998Ø     17                   *
*       Ø        15       1ØØØ    9aØØ      7                   *
*       Ø        16       1Ø8Ø    9a8Ø     18                   *
*       Ø        17       11ØØ    9bØØ      8                   *
*       Ø        18       118Ø    9b8Ø     19                   *
*       Ø        19       12ØØ    9cØØ      9                   *
*       Ø        2Ø       128Ø    9c8Ø     2Ø                   *
*       Ø        21       13ØØ    9dØØ     1Ø      BDOS         *
*       Ø        22       138Ø    9d8Ø     21                   *
*       Ø        23       14ØØ    9eØØ     11                   *
*       Ø        24       148Ø    9e8Ø     22                   *
*       Ø        25       15ØØ    9fØØ     12                   *
*       Ø        26       158Ø    9f8Ø     23                   *
*                                                               *
* Track 1 is recorded in double density format.  There are      *
* 1Ø24 bytes per sector.                                        *
*                                                               *
*       1         1       16ØØ    aØØØ      4                   *
*       1         2       1aØØ    a4ØØ      1                   *
*       1         3       1eØØ    a8ØØ      5      CBIOS (@ abØØh) *
*       1         4       22ØØ    acØØ      2                   *
*       1         5       26ØØ    bØØØ      6                   *
*       1         6       2aØØ    b4ØØ      3                   *
*       1         7       2eØØ    b8ØØ      7                   *
*       1         8       32ØØ    bcØØ             Unused       *
*                                                               *
* Note that the interleave sequences for loading tracks Ø and 1 *
* are different.  This difference was designed so that the      *
* boot sequence could be done in 4 disk revolutions since the   *
* 2D Mod. B can not load consecutive sectors off of the disk.   *
*                                                               *
* Three spare sectors (track Ø, sectors 2 to 4) have been       *
```

Boot Provided with
CBIOS 2.9
8/22/82
(ABOOT&.ASM)

```
* provided for a more advanced boot loader at a later date.        *
*                                                                  *
*                                                                  *
* Hard boot (M1Ø, M2Ø, M26):                                       *
* The cold boot loader (track Ø, sector 1) is loaded into          *
* RAM at either Ø1ØØh or the 2DB's RAM depending on whether        *
* this loader is assembled with a 2DB or not.  This cold           *
* boot loader will start loading the CCP from track Ø,             *
* sector 2 and will finish up with the last part of the            *
* CBIOS on track Ø sector 21.                                      *
*                                                                  *
*   track    sector     sysgen    load order      Name             *
*       Ø         1        9ØØ    fcØØ      1     Cold boot        *
*       Ø         2        bØØ    95ØØ      3     CCP              *
*       Ø         3        dØØ    97ØØ      4                      *
*       Ø         4        fØØ    99ØØ      5                      *
*       Ø         5       11ØØ    9bØØ      6                      *
*       Ø         6       13ØØ    9dØØ      7     BDOS             *
*       Ø         7       15ØØ    9fØØ      8                      *
*       Ø         8       17ØØ    a1ØØ      9                      *
*       Ø         9       19ØØ    a3ØØ     1Ø                      *
*       Ø        1Ø       1bØØ    a5ØØ     11                      *
*       Ø        11       1dØØ    a7ØØ     12                      *
*       Ø        12       1fØØ    a9ØØ     13                      *
*       Ø        13       21ØØ    abØØ     14     CBIOS            *
*       Ø        14       23ØØ    adØØ     15                      *
*       Ø        15       25ØØ    afØØ     16                      *
*       Ø        16       27ØØ    b1ØØ     17                      *
*       Ø        17       29ØØ    b3ØØ     18                      *
*       Ø        18       2bØØ    b5ØØ     19                      *
*       Ø        19       2dØØ    b7ØØ     2Ø                      *
*       Ø        2Ø       2fØØ    b9ØØ      2     Partial load     *
*       Ø        21       3ØØØ                    Unused           *
*                                                                  *
* The warm boot load sequence starts at track Ø, sector 2          *
* and goes straight through to sector 12.  There is still          *
* plenty of room left in this loader for more advanced             *
* things like sector interleaving although this is hardly          *
* necessary on a hard disk.                                        *
*                                                                  *
********************************************************************

msize   equ     48                ;Memory size of target CP/M
bias    equ     (msize-2Ø)*1Ø24   ;Memory offset from 2Øk system
ccp     equ     25ØØh+bias        ;Console command processor
bios    equ     ccp+16ØØh         ;CBIOS address
cboot   equ     bios              ;Cold boot address for CP/M
loaddr  equ     ccp               ;Load address for floppy
retries equ     1Ø                ;Maximum # of disk retries

********************************************************************
*                                                                  *
* The following equates set up the relationship between the        *
* 2D floppies and the Hard Disk Controllers.                       *
*                                                                  *
********************************************************************

first   equ     1                 ;Ø = Floppies are A-D drives and
                                  ;       Hard Disk are E-P
                                  ;1 = Hard Disks are A-L drives and
                                  ;       Floppies are M-P
maxhd   equ     1                 ;Set to number of hard disks
maxflop equ     4                 ;Set to number of floppies

********************************************************************
*                                                                  *
* The following equates are for the Diskus Hard disk if wanted. *
*                                                               *
*****************************************************************

        if      (maxhd ne Ø) and first  ;Want Hard Disk included ?
hdorg   equ     5Øh             ;Hard Disk Controller
hdstat  equ     hdorg           ;Hard Disk Status
hdcntl  equ     hdorg           ;Hard Disk Control
hddata  equ     hdorg+3         ;Hard Disk Data
hdfunc  equ     hdorg+2         ;Hard Disk Function
hdcmnd  equ     hdorg+1         ;Hard Disk Command
hdreslt equ     hdorg+1         ;Hard Disk Result
retry   equ     2               ;Retry bit of result
tkz     equ     1               ;Track zero bit of status
opdone  equ     2               ;Operaction done bit of status
complt  equ     4               ;Complete bit of status
tmout   equ     8               ;Time out bit of status
wfault  equ     1Øh             ;Write fault bit of status
drvrdy  equ     2Øh             ;Drive ready bit of status
indx    equ     4Øh             ;Index bit of status
pstep   equ     4               ;Step bit of function
nstep   equ     Øfbh            ;Step bit mask of function
hdrlen  equ     4               ;Sector header length
secln   equ     512             ;Sector data length
wenabl  equ     Øfh             ;Write enable
wreset  equ     Øbh             ;Write reset of function
scenbl  equ     5               ;Controller control
dskclk  equ     7               ;Disk clock for control
mdir    equ     Øf7h            ;Direction mask for function
null    equ     Øfch            ;Null command
idbuff  equ     Ø               ;Initialize data command
isbuff  equ     8               ;Initialize header command
rsect   equ     1               ;Read sector command
wsect   equ     5               ;Write sector command
        endif

*****************************************************************
*                                                               *
* The following equates are for the Disk Jockey 2D/B if wanted. *
*                                                               *
*****************************************************************

        if      maxflop ne Ø
origin  equ     Øf8ØØh          ;Orgin of DJ 2D Mod B PROM
djram   equ     origin+4ØØh
                                ;Disk Jockey 2D Mod B routines
tkzero  equ     origin+9h       ;Track Ø seek
trkset  equ     origin+Øch      ;Set track
setsec  equ     origin+ØfH      ;Set sector
setdma  equ     origin+12h      ;Set DMA address
dread   equ     origin+15h      ;Read sector
dmast   equ     origin+24h      ;Get DMA address
status  equ     origin+27h      ;Disk status
dskerr  equ     origin+2ah      ;Flash error light
setden  equ     origin+2dh      ;Set density
        endif

if      first                   ;Define start address if hard disk
        if      maxflop ne Ø
boot    equ     djram           ;If floppy is there then use its RAM
        else
boot    equ     Ø1ØØh           ;Otherwise start at Ø1ØØh
        endif
        else                    ;Define start address if floppy
boot    equ     djram+Ø3ØØh     ;Upper quarter of floppy RAM
        endif
```

```
offset  equ     9ØØh-boot       ;DDT offset

*****************************************************************
*                                                               *
* Cold Boot loader for Discus M1Ø, M2Ø, or M26.                 *
*                                                               *
*****************************************************************

        if      first           ;first = 1 is hard disk

        org     boot

boothd  lxi     sp,cstkhd       ;Set up stack at end of this sector
        lxi     b,1*1ØØh+2Ø     ;B = sector count, C = sector #
        call    clodhd          ;Load sector 2Ø into CCP
        lxi     h,ccp+leØØh     ;Destination of move
        lxi     d,ccp           ;Source of move
        mvi     c,Ø
cmovhd  ldax    d               ;Get a byte of source
        mov     m,a             ;Move it
        inx     h               ;Bump destination
        inx     d               ;Bump source
        dcr     c               ;All done with this page ?
        jnz     cmovhd
        lxi     h,ccp-2ØØh      ;Initial DMA address
        shld    cdmahd
        lxi     b,18*1ØØh+2     ;B = sector count, C = sector #
        call    clodhd
        jmp     cboot           ;Go to CP/M

clodhd  push    b               ;Save sector and count
        mov     a,c
        sta     hdsec
        lxi     h,ccp-2ØØh      ;Get DMA address (self modifying)
cdmahd  equ     $-2             ;Storage for previous DMA address
        lxi     d,2ØØh          ;Offset to new DMA address
        dad     d               ;Add in offset, HL = new DMA address
        shld    cdmahd          ;Save new DMA address
        call    crdhd           ;Attempt a read
        pop     b               ;Recover sector number and count
                                ;       B = count, C = number
        dcr     b               ;Update sector count
        rz                      ;All done ?
        inr     c
        jmp     clodhd          ;Continue reading

*****************************************************************
*                                                               *
* Rdhd does the actual read from the controller, the DMA        *
* address and sector # have already been set up.                *
*                                                               *
*****************************************************************

crdhd   lxi     b,retries*1ØØh+1 ;Maximum # of attempts
crhd    push    b               ;Save error count
        call    hdread          ;Attempt the read
        pop     b               ;Restore the error count
        rnc                     ;Return if no error
        dcr     b               ;Update error count
        jnz     crhd            ;Try again if not to many errors
        jmp     $               ;Dynamic error halt

hdread  call    hdprep          ;Prepare the sector header image
        rc                      ;Error exit
        mvi     a,rsect         ;Read sector command
        out     hdcmnd
        call    process         ;Process the read
        rc                      ;Error exit
        xra     a               ;Pointer to data buffer
        out     hdcmnd
        mvi     b,secln/4       ;Number of bytes to read
        lhld    cdmahd          ;Get destination of data
        in      hddata          ;Two dummy data bytes
        in      hddata
rtloop  in      hddata          ;Move four bytes
        mov     m,a             ;Byte one
        inx     h
        in      hddata          ;Byte two
        mov     m,a
        inx     h
        in      hddata          ;Byte three
        mov     m,a
        inx     h
        in      hddata          ;Byte four
        mov     m,a
        inx     h
        dcr     b               ;Update byte count
        jnz     rtloop
        ret

process in      hdstat          ;Wait for command to finish
        mov     b,a
        ani     opdone
        jz      process
        mvi     a,dskclk        ;Turn on Disk Clock
        out     hdcntl
        in      hdstat
        ani     tmout           ;Timed out ?
        stc
        rnz
        in      hdreslt
        ani     retry           ;Any retries ?
        stc
        rnz
        xra     a               ;No error exit
        ret

hdprep  in      hdstat          ;Is Drive ready ?
        ani     drvrdy
        stc
        rnz
        mvi     a,isbuff        ;Initialize pointer to header buffer
        out     hdcmnd
        mvi     a,null
        out     hdfunc          ;Select drive A
        xra     a
        out     hddata          ;Form head byte
        out     hddata          ;Form track byte
        mvi     a,Ø             ;Form sector byte
hdsec   equ     $-1
        out     hddata
        mvi     a,8Øh           ;Form Key
        out     hddata
        mvi     a,dskclk        ;Turn on Disk clock
        out     hdcntl
        mvi     a,wenabl        ;Write enable on
        out     hdcntl
        ret

        org     boothd+2ØØh-2
```

```
cstkhd  equ     $
        dw      boothd

        else                    ;first = Ø is floppy disk

*****************************************************************
*                                                               *
* Cold boot loader for the Disk Jockey 2D Revision B controller *
*                                                               *
*****************************************************************

        org     boot

tØboot  mvi     a,5-2           ;First sector - 2
newsec  equ     $-1
        inr     a               ;Update sector #
        inr     a
        cpi     27              ;Size of track in sectors + 1
trksiz  equ     $-1
        jc      nowrap          ;Skip if not at end of track
        jnz     t1boot          ;Done with this track
exit    equ     $-2
        sui     27-6            ;Back up to sector 6
backup  equ     $-1
        lxi     h,loaddr-8Øh    ;Memory address of sector - 1ØØh
nxtdma  equ     $-2
        shld    newdma
nowrap  sta     newsec          ;Save the updated sector #
        mov     c,a
        call    setsec          ;Set up the sector
        lxi     h,loaddr-1ØØh   ;Memory address of sector - 1ØØh
newdma  equ     $-2
        lxi     d,1ØØh          ;Update DMA address
secsiz  equ     $-2
        dad     d
nowrp   shld    newdma          ;Save the updated DMA address
        mov     b,h
        mov     c,l
        call    setdma          ;Set up the new DMA address
        lxi     b,retries*1ØØh+Ø;Maximum # of errors, track #
nxtrty  equ     $-2
fread   push    b
        call    trkset          ;Set up the proper track
        call    dread           ;Read the sector
        pop     b
        jnc     tØboot          ;Continue if no error
        dcr     b
        jnz     fread           ;Keep trying if error
        jmp     dskerr          ;Too many errors, flash the light

t1boot  lxi     h,cboot         ;We jump to cboot next time
        shld    exit
        mvi     c,1             ;Select double density
        call    setden
        xra     a               ;First sector - 2
        sta     newsec
        mvi     a,8             ;Size of (logical) track + 1
        sta     trksiz
        dcr     a               ;Number of sectors to back up
        sta     backup
        lxi     h,loaddr+Ø7ØØh  ;DMA start address for first revolution - 2Ø48
        shld    newdma
        lxi     h,loaddr+Ø3ØØh  ;DMA start address for second revolution - 2Ø48
        shld    nxtdma
        lxi     h,2Ø48          ;Difference between DMA addresses
        shld    secsiz
        lxi     h,retries*1ØØh+1;Maximum # of errors, track #
        shld    nxtrty
        jmp     tØboot          ;Go load in track 1
        endif

        end
```